and arteries may not have the same fabrick as those of the Intestines . . . I propose to be considered and examined by persons of more acute hands and judgment; as I do all what I have here delivered, nor daring too much to trust even the informations of my own hands and eyes, till I find them confirmed by those of others, more judicious as well as more dextrous in making experiments.

After two centuries Professor Carey has supplied the needed confirmation *except in one particular;* he finds that the spiral winds in the opposite direction! Carey describes a "left-handed helix,"—a spiral which reverses the direction of the rotation of the embryonic stomach and goes counter to the twisting of the œsophagus. But Dr. Cole recorded the type familiar in dextral gastropod shells, which accords with the rotation of the stomach. Although it often happens in nature, as noted by Thompson, that two opposite systems of geodetic spirals exist together, and interfere with one another, forming a criss-cross pattern[1] (and indeed such a condition has been recorded for the œsophageal muscles of ruminants[2]), it can not be invoked to reconcile the conflicting statements regarding the direction of the intestinal spiral, since both Cole and Carey agree that there is but one well-defined cleavage. Under these circumstances, the question has been referred to Professor Sykes, who, during the past season, while studying in the Harvard Laboratory, has frequently unwound the circular muscle of the intestine. Although his results are to be published elsewhere, I am permitted to report that he has verified the early work of Dr. Cole in regard to the direction assumed by the spiral; it is dextral. If this is so, Dr. Carey's explanation of that primary torsion of the embryonic intestine which determines the disposition of small and large bowels in the adult, though very ingenious, must be considered illusory, for it depends on sinistral coiling and tension.[3]

The origin of the spiral trend of the muscles is ascribed by Dr. Carey to "the rotating spiral growth of the epithelial cells,"[4] but this is a phase of the problem which invites further study.

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[1] *Growth and Form,* 1917, p. 489.

[2] Owen: *Comp. Anat. of Vert.,* 1868, Vol. 3, p. 470.

[3] *Journ. Gen. Physiol.,* 1920, Vol. 3, p. 76 *et seq.*

[4] *Anat. Rec.,* 1920, Vol. 19, p. 220.

NEARCTIC PROTURANS

THE Protura—the most primitive of all the insects, if indeed they are insects—were first reported from the Nearctic Region in 1909. In that year the eminent Italian zoologist and entomologist, F. Silvestri, collected and described under the name of *Eosentomon wheeleri,* a single species from New York. For the next twelve years no record was added from the vast area of the Nearctic.

The second record from this region was obtained in 1921 from the vicinity of Washington, D. C., the first specimen being found by H. S. Barber, who accidentally came across it in some leaf mold in which he was rearing beetle larvæ. Other specimens of the same species, which proved to be new, were soon taken, and the species described by the writer as *Acerentulus barberi.*[1]

Following the initial discovery at Washington the writer has been fortunate enough to encounter Proturans in large numbers and in considerable diversity at Takoma Park, Maryland. Here during the spring of 1921 no less than twelve species, representing six genera, were found, ten of them proving to be new. These have been described in a paper presented at a meeting of the Entomological Society of Washington.[2]

To these records obtained in the vicinity of Washington are now added several more from widely separated localities, and in some instances from different life zones of the Nearctic Region. These localities are as follows: Chesapeake Beach, Md.; top of Blue Ridge Mountains, near Bluemont, Va. (elevation 1,200 feet); near Prospect Hill, Va.;

[1] "A Second Nearctic Species of Protura, *Acerentulus barberi,* new species." *Ent. News,* Vol. XXXII, pp. 239-241.

[2] "New Genera and Species of Protura," *Proc. Ent. Soc. Wash.,* Vol. XXIII, No. 9, pp. 193-202, Pl. XVI.

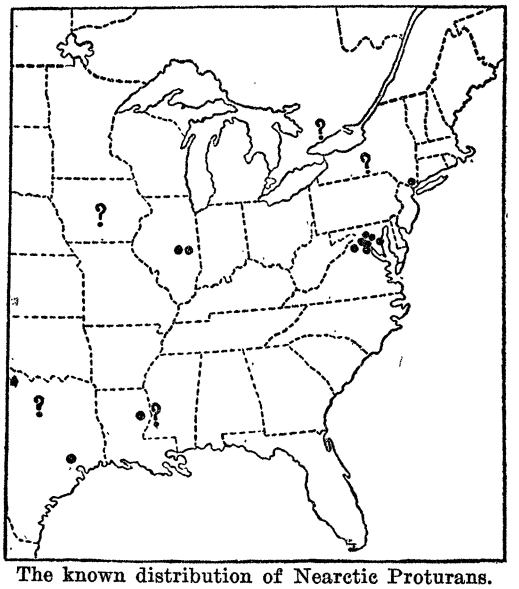
Great Falls, Va.; Tallulah, La.; Houston, Tex.; Chesterville, Ill.; near Decatur, Ill.

Proturans have been searched for but not found in the following localities: Vicksburg, Miss.; Dallas, Tex.; Ames, Ia.; Toronto, Can. In addition, also, Professor Silvestri has looked for them at Ithaca, N. Y., without finding any.

The known distribution up to date of Proturans in the Nearctic is shown by the accompanying figure, each positive record being indicated by a large dot and each negative record by a question mark.

It would be premature at this time to attempt any generalizations in regard to the Nearctic distribution of these most primitive hexapods, yet by way of summary it may be noted that up to the present Proturans have been found in 9 localities in the Upper Austral Life Zone, these records coming from 4 different states; from 2 localities in the Lower Austral Life Zone, the records being from different states; from 1 locality in the Transition Life Zone. Of the negative records, 1 is from the Upper Austral, 2 from the Lower Austral and 2 from the Transition.

The only life zone in which these hexapods have been found in either abundance or diversity is the Upper Austral. In the Lower Austral only two minute under-bark species were taken—two specimens of *Eosentomon pallidum* Ewing from Tallulah, La., and two specimens of *Eosentomon minimum* Ewing from Houston, Tex. In the Transition, three specimens of *Eosentomon wheeleri* Silvestri and one specimen of *Eosentomon pallidum* Ewing were taken from decaying leaves and twigs near Bluemont, Va., at the top of the Blue Ridge Mountains (elevation 1,200 feet).



The known distribution of Nearctic Proturans.

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STEM END ROT OF APPLES

DURING the late spring of 1921 a large number of apples were found which developed a decay at and around the base of the stems. These apples were in a lot that had been removed from a cold storage temperature of 32° and held for a few days at 45° Fahr. When placed in moist chambers such apples very soon decayed without wrinkling, becoming soft and watery. The decay was of a sharply defined nature, such that the affected parts could be easily removed. Normally these decayed apples were soon covered with green mold. On examining the stems of apples in storage it was found that many stems were green with spores. Cultures of this mold were made by the poured plate method. The fungus was believed to be *Penicillium expansum* Link., and was later identified as such by Mr. Charles Thom of the U. S. D. A., Bureau of Chemistry.

A search of the literature on apple decay was made, but no mention of the entrance of a decay-producing organism through the stem was noted. The decay of apples ordinarily caused by *P. expansum* is invariably mentioned in connection with abrasions of the skin, such as insect punctures, wounds or injuries of a mechanical nature. Some writers mentioned the infection as entering through the calyx or blossom end but no one noted stem end infection.

The matter was taken up with Mr. E. A. Siegler, assistant pathologist of the U. S. D. A., Bureau of Plant Industry; Mr. Charles Brooks, pathologist, and Dr. Charles Thom, mycologist, U. S. D. A., Bureau of Chemistry, none of whom had noted such a decay gaining access to the apple by way of the stem. In fact they